

## **Geotechnical Consulting Services**

Geologically Hazardous Areas Report  
The Osprey  
Proposed Residential Development  
King County Tax Parcel 9270700080  
7440 159<sup>th</sup> Place NE  
Redmond, Washington

*for*

**G.W. Williams Co. and  
PemReal Advisors LLC**

June 7, 2019



## **Geotechnical Consulting Services**

Geologically Hazardous Areas Report  
The Osprey  
Proposed Residential Development  
King County Tax Parcel 9270700080  
7440 159<sup>th</sup> Place NE  
Redmond, Washington

*for*

**G.W. Williams Co. and  
PemReal Advisors LLC**

June 7, 2019



17425 NE Union Hill Road, Suite 250  
Redmond, Washington 98052  
425.861.6000

**Geotechnical Consulting Services**  
**Geologically Hazardous Areas Report**  
**The Osprey**  
**Proposed Residential Development**  
**King County Tax Parcel 9270700080**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

**File No. 23699-001-01**

**June 7, 2019**

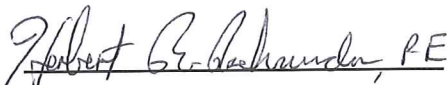
Prepared for:


G.W. Williams Co.  
3190 Clearview Way, Suite 200  
San Mateo, California 94402

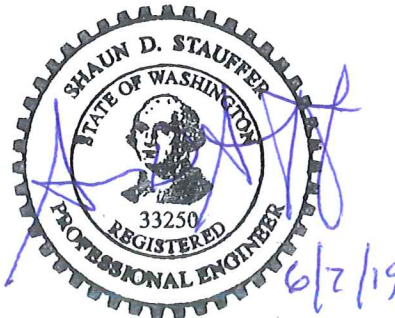
Attention: Scott W. Williams, Sean Williams

Prepared by:

GeoEngineers, Inc.  
17425 NE Union Hill Road, Suite 250  
Redmond, Washington 98052  
425.861.6000

  
Herbert R. Pschunder, PE  
Senior Geotechnical Engineer

  
Shaun D. Stauffer, PE, LEED AP  
Principal



HRP:SDS:nld

cc: Carl Vander Hoek, Cleverly Development Consulting (one copy by email)  
Barry Leahy (one copy by email)  
Doug Pernerl, PemReal Advisors LLC (one copy by email)

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

## Table of Contents

<b>1.0 INTRODUCTION .....</b>	<b>1</b>
1.1. Project Description.....	1
1.2. Purpose and Scope.....	1
<b>2.0 REQUIREMENTS OF REDMOND ZONING CODE .....</b>	<b>2</b>
<b>3.0 SITE DESCRIPTION.....</b>	<b>3</b>
3.1. Geology .....	3
3.2. Surface Conditions.....	4
3.3. Previous Subsurface Explorations .....	4
3.4. Subsurface Soil Conditions .....	5
3.5. Groundwater Conditions.....	5
<b>4.0 PROPOSED IMPROVEMENTS .....</b>	<b>5</b>
<b>5.0 GEOLOGICALLY HAZARDOUS AREAS EVALUATION .....</b>	<b>5</b>
5.1. General Information (Appendix 1.A) .....	6
5.2. Geologically Hazardous Areas Reporting Requirements (Appendix 1.E).....	8
5.3. Earthquake Engineering .....	10
5.3.1. 2015 IBC Seismic Design Information .....	10
5.3.2. Seismic Hazards .....	10
<b>6.0 LIMITATIONS .....</b>	<b>11</b>
<b>7.0 REFERENCES .....</b>	<b>11</b>

## LIST OF FIGURES

Figure 1. Vicinity Map  
Figure 2. Site Plan  
Figure 3. DCI Engineers, Inc. Sheet C-1  
Figure 4. Seismic Hazard Areas

## APPENDICES

Appendix A. Previous Explorations  
Appendix B. Report Limitations and Guidelines for Use



## 1.0 INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) is pleased to submit this Geologically Hazardous Areas evaluation and report for the proposed residential development (The Osprey) on property located at 7440 159<sup>th</sup> Place NE in Redmond, Washington. The property is identified as King County Tax Parcel Number 9270700080.

The location of the site is shown on the Vicinity Map, Figure 1. The project site is shown in relation to surrounding features on the Site Plan, Figure 2.

### 1.1. Project Description

We understand the property will be redeveloped with a multi-story mixed-use residential building. Based on conceptual plans prepared by the project architect, HKS, Inc., and dated May 30, 2019, the project will consist of a six-story building with one level of below-grade parking. The ground level will include additional parking, retail and residential spaces and the upper five stories will include residential space. The floor slab for the half level basement is planned to be approximately 10 feet below existing grade. An elevator pit will extend to about 15 feet below existing grade.

The building footprint will occupy nearly the entire 0.62 acre site. An infiltration trench for disposal of site stormwater runoff is planned between the east side of the building and the adjacent east property line.

### 1.2. Purpose and Scope

The purpose of this study is to evaluate geologic and geotechnical conditions for the site under existing and developed conditions and prepare a Geologically Hazardous Areas report in accordance with the following City of Redmond documents:

- Application Requirements for PREP [Pre Review Entitlement Process] – Land Use Entitlement.
- Appendix 1.E, “Critical Areas Reporting Requirements – Geologically Hazardous Areas” of the Redmond Zoning Code (RZC), Sections 21.64-21.72.

Our services were completed in accordance with our revised proposal dated May 20, 2019. Written authorization to proceed with our design phase and permitting services was provided by Sean Williams of G.W. Williams Co. on May 20, 2019.

The RZC also lists Critical Aquifer Recharge Areas (CARAs) as critical areas with related reporting requirements included in Appendix 1.F. Our CARA report for this project is being submitted separately. GeoEngineers has prepared a design phase geotechnical report which is also being submitted separately.

## 2.0 REQUIREMENTS OF REDMOND ZONING CODE

The following sections are quoted from RZC Section 21.64.060 and classify Geologically Hazardous Areas, with reference to definitions by the National Resources Conservation Service (NRCS; formerly the United States Department of Agriculture Soil Conservation Service, SCS), the United States Geological Survey (USGS), and the Washington State Department of Natural Resources (DNR):

*Geologically Hazardous Areas within the City of Redmond shall be rated or classified according to their characteristics, function and value, and/or their sensitivity to disturbance.*

1. *Geologically Hazardous Areas Classifications. Geologically hazardous areas shall be classified according to the criteria in this section.*
  - a. *Erosion Hazard Areas. Erosion hazard areas are lands or areas underlain by soils identified by the U.S. Department of Agriculture Soil Conservation Service (SCS) as having “severe” or “very severe” rill and inter-rill erosion hazards. This includes, but is not limited to, the following group of soils when they occur on slopes of 15 percent or greater: Alderwood-Kitsap (Akf), Alderwood gravelly sandy loam (AgD), Kitsap silt loam (KpD), Everett (EvD), and Indianola (InD).*
  - b. *Landslide Hazard Areas. Landslide hazard areas are areas potentially subject to significant or severe risk of landslides based on a combination of geologic, topographic, and hydrogeologic factors. They include areas susceptible because of any combination of bedrock, soil, slope, slope aspect, structure, hydrology, or other factors. They are areas of the landscape that are at a high risk of failure or that presently exhibit downslope movement of soil and/or rocks and that are separated from the underlying stationary part of the slope by a definite plane of separation. The plane of separation may be thick or thin and may be composed of multiple failure zones depending on local conditions, including soil type, slope gradient, and groundwater regime.*

*Landslide hazard areas include:*

- i. *Areas of historic failures, such as:*
  - A. *Areas designated as quaternary slumps or landslides on maps published by the United States Geological Survey (USGS); or*
  - B. *Those areas designated by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) as having a “severe” limitation of building site development.*
- ii. *Areas containing a combination of slopes steeper than 15 percent, springs or groundwater seepage, and hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock;*
- iii. *Areas that have shown movement during the Holocene epoch (from 10,000 years ago to the present) or which are underlain or covered by mass wastage debris of that epoch;*
- iv. *Slopes that are parallel or subparallel to planes of weakness in subsurface materials;*
- v. *Slopes having gradients steeper than 80 percent subject to rockfall during seismic shaking;*

- vi. *Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action; or*
      - vii. *Any area with a slope 40 percent or steeper with a vertical relief of 10 feet or more.*
    - c. *Seismic Hazard Areas. Seismic hazard areas are lands subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, soil liquefaction, or surface faulting.*
  - 2. *Classification of geologically hazardous areas shall be determined by the Committee based on consideration of the following factors:*
    - a. *Maps adopted pursuant to this chapter include the landslide hazard area, erosion hazard area, and seismic hazard areas maps, which identify the approximate location and extent of these hazard areas. These maps shall be used as a general guide only for the assistance of property owners and other interested parties; boundaries are generalized. The actual type, extent, and boundaries of geologically hazardous areas shall be determined in the field by a qualified consultant according to the procedures, definitions, and criteria established by this chapter. In the event of any conflict between the critical area location and designation shown on the City's map and the criteria or standards of this section, the criteria and standards shall prevail;*
    - b. *Maps published by other governmental agencies such as:*
      - i. *USGS landslide hazard and seismic hazard maps;*
      - ii. *Department of Natural Resources (DNR) seismic hazard maps for western Washington and slope stability maps;*
    - c. *Application of the criteria contained in these regulations; and*
    - d. *Consideration of the technical reports submitted by qualified consultants in connection with applications subject to these regulations.*

### **3.0 SITE DESCRIPTION**

The project site consists of one parcel (King County Tax Parcel Number 9270700080) as shown on Figure 2. The site comprises approximately 0.62 acres and is located at 7440 159<sup>th</sup> Place NE in downtown Redmond, Washington.

#### **3.1. Geology**

The project lies in the downtown Redmond area of the Sammamish River valley. The valley is a major glacial trough between glaciated uplands to the west and east. The valley trends north to south and is underlain by recent alluvium and glacial recessional outwash sediments.

Geologic information for the project vicinity was obtained from the map entitled "Geologic Map of the Kirkland Quadrangle, Washington" (Minard 1983) published by the USGS. The native geologic unit mapped in the site vicinity consists of alluvium.

The alluvium is mapped along and east of the Sammamish River and consists primarily of near-surface organic rich fine sand, silt and clay. Peat layers are often present in the upper few feet of the alluvium. Sand and gravel alluvial deposits underlie the surficial soils.

Fill associated with past grading for existing building and pavement areas mantles the alluvial deposits.

Recessional outwash deposits are known to underlie the alluvium at depth. The recessional outwash typically consists of sand and gravel with variable silt, cobble and boulder content deposited by meltwater flowing from a receding ice sheet that occupied the Sammamish River valley during the last glacial epoch.

### **3.2. Surface Conditions**

The site is bounded on the north by a recently completed apartment building (The Carter), on the east by the wooded Heron Rookery Park, on the south by Leary Way NE, and on the west by 159<sup>th</sup> Place NE. The property is owned by G.W. Williams Co. and is currently occupied by automotive facilities (A1 Luxury Motors and Harvey's Auto Service). The one-story automobile facility building occupies the east part of the site. Asphalt paved parking and driveway areas are in the north and west parts of the site.

The existing building was constructed in 1968. The property was historically operated as Evans Auto Center. Occupants of the building have included auto repair businesses going back to the first occupants following construction of the building. Prior tenants have also included a feed company, a carpet and interiors company, and an appliance services company.

The ground surface is generally level. The finished floor of the existing building is at about Elevation 43 feet. (Elevations in this report refer to the North American Vertical Datum of 1988 [NAVD 88].) Surface grades outside the building range from about Elevation 41 to 43 feet. Underground power and fiber optic lines extend along the west edge of the site.

### **3.3. Previous Subsurface Explorations**

GeoEngineers completed geotechnical engineering services in 1988 for improvements to Leary Way, which extends along the south side of the site. Several borings were drilled as part of that project, including a boring (B-7) about 125 feet southwest of the intersection of Leary Way and 159<sup>th</sup> Place NE (see Figure 2).

Associated Earth Sciences, Inc. (AESI) completed geotechnical engineering services for the adjacent properties to the north (7494 and 7500 159<sup>th</sup> Place NE) which are summarized in a report dated April 18, 2014. Several borings were drilled for that project, including a boring (EB-4) near the northwest corner of the Evans site. AESI also completed a hydrogeologic and infiltration assessment for the properties in 2015; the assessment included test pits and additional borings.

A Phase II Environmental Site Assessment (ESA) was completed in 2018 by G-Logics, Inc. and summarized in a report dated June 28, 2018. The Phase II ESA included 11 borings, three of which were completed as groundwater monitoring wells (GLMW-1, -2 and -3), with the remaining 8 borings (GLB-1 through GLB-8) being backfilled. The approximate locations of these borings and monitoring wells are shown on Figure 2.

Logs of the previous explorations are included in Appendix A.

### 3.4. Subsurface Soil Conditions

Based on our review of available subsurface information, the subsurface soils at the site generally consist of varying thicknesses of fill overlying medium dense to dense granular alluvial and recessional deposits, as discussed below:

- **Pavement and Floor Slab Materials:** Several of the borings were drilled within asphalt paved areas and within the existing building. The thicknesses of the pavement and floor slab were not noted on the boring logs.
- **Fill:** Existing fill was apparently encountered in the upper 5 feet of borings GLMW-3 and GLB-8, based on the presence of wood fragments. The fill layer is described as loose sand with gravel. The remaining boring logs did not note the presence of fill.
- **Granular Alluvium/Recessional Outwash:** Medium dense to dense sand and gravel deposits were encountered in each of the explorations and extend to the maximum depth explored, 41½ feet. The upper portion of these deposits is alluvium, while the lower portion could be recessional outwash. Cobbles and boulders are known to be present in the alluvium and recessional outwash.

### 3.5. Groundwater Conditions

Groundwater was encountered in the previous explorations and monitoring wells within about 18 to 20 feet of the existing ground surface, based on measurements made in late June 2018. We measured groundwater levels in the wells at similar depths on March 1, 2019.

This groundwater represents a shallow aquifer within the near surface alluvial soils that is part of the Redmond Alluvial Aquifer underlying the downtown area. This aquifer is in direct hydraulic communication with the Sammamish River, located within 200 feet of the southern end of the site. Groundwater flows to the north and northwest to the Sammamish River. Based on our recent measurements, the groundwater gradient across the site is approximately 0.004 (0.4 feet of elevation difference over a horizontal distance of 100 feet).

We expect the groundwater level will rise in response to seasonal precipitation and flood stages of the river and could be as high as 7 to 10 feet below the ground surface during flood stage.

## 4.0 PROPOSED IMPROVEMENTS

The proposed project includes a multi-story residential building that will occupy most of the property. A preliminary layout of the building area is shown in Figure 2. A one level below-grade parking structure is planned for the building. Suitable foundation support will consist of shallow foundations placed directly on the medium dense to dense granular alluvial soils, or on a zone of compacted crushed rock fill replacing loose soils that may be encountered at footing subgrade level. An infiltration trench is planned to be located along the east side of the building.

## 5.0 GEOLOGICALLY HAZARDOUS AREAS EVALUATION

The specific information required by the City of Redmond to complete the geologically hazardous areas evaluation is described in this section, in accordance with RZC 21.64-21.72 and related Appendix 1,

Sections A and E. The information requirements are reproduced below, with specific responses for the project provided in bold.

### 5.1. General Information (Appendix 1.A)

*The following General Information is required to be submitted for sites containing critical areas.*

1. *Name of proposal as shown on City applications.* **The Osprey**
2. *Name of applicant as shown on City applications.* **G.W. Williams Co.**
3. *Name of organization and individual providing this information.* **GeoEngineers, Inc. Herbert R. Pschunder, PE and Shaun Stauffer, PE, LEED AP of GeoEngineers complied and provided the information in this report.**
4. *List any technical expertise/special qualifications of person providing this information.* **Shaun Stauffer is a licensed geotechnical engineer in the State of Washington with extensive experience in multi-use residential and commercial developments including within the City of Redmond. He has been Principal-in-Charge of projects involving geologic hazard evaluation, seismic design, foundation design and temporary shoring. He has over 26 years of experience.**
5. *Date the information was prepared.* **June 7, 2019**
6. *Location of the proposed activity (street address and tax parcel number), including a vicinity map.* **The proposed development will be located at 7440 159<sup>th</sup> Place NE near downtown Redmond, Washington, as shown on the Vicinity Map, Figure 1. The project site is identified as King County Tax Parcel Number 9270700080.**
7. *Clearly identify the development proposal being addressed, including City file number and key project drawing references (originator of drawings, originator's reference number if shown on the drawings, sheet numbers, revision numbers and dates for each sheet, and include reduced copies of key drawings in the report).* **The City of Redmond has identified the project number as LAND-2019-00124. A preliminary layout of the building and an infiltration trench is shown on a drawing prepared by the project civil engineer, DCI Engineers, Inc. (Sheet C-1, DCI Project Number 19012-0002, dated February 1, 2019). The drawing is included as Figure 3 in this report. Additional project drawings will be prepared by DCI Engineers and the design team as part of the permit application process.**
8. *Give a succinct but inclusive description of the existing site, including acreage and current and past uses on the property.* **The site comprises approximately 0.62 acres. A summary description of the site and current and past uses of the site is provided above in the section "Surface Conditions."**
9. *A copy of an aerial photo with overlays displaying site boundaries and critical areas.* **An aerial photo is included as Figure 4. The critical area applicable to this site includes a mapped Seismic Hazard Area. The site is not within mapped Erosion or Landslide Hazard areas.**
10. *A single map showing all critical areas at one inch equals 20 feet scale, depicting:*
  - a. *Identified critical areas and required buffers;*
  - b. *Limits of any areas to be disturbed;*
  - c. *Site boundary property lines and roads;*

- d. *Rights-of-way and easements;*
- e. *Existing physical improvements (buildings, fences, impervious surfaces, utilities, etc.);*
- f. *Contours at two-foot intervals;*
- g. *All natural and manmade features within the maximum buffer area of any critical area on or near the site (in no case less than a minimum 50 feet from the site).*

**The above information is shown on the Site Plan, Figure 2. (The full size (22 inches by 34 inch) PDF version of Figure 2 is at a scale of 1 inch equals 20 feet.). The entire site is located within a mapped Seismic Hazard Area. The site is not located within mapped Erosion or Landslide Hazard Areas due to level topography.**

11. *A statement specifying the accuracy of the report and key project specific assumptions made and relied upon. List recommendations, if any, for further reporting regarding critical areas related to the proposed project as the project proceeds. **Our evaluation is based on review of available subsurface information from the sources identified in the section “Previous Subsurface Explorations” above and geologic mapping, liquefaction analyses, and our experience with seismic engineering in the Redmond area. The proposed building will be founded on spread foundations located approximately 12 feet below existing grades, therefore, we have evaluated liquefaction potential based on the approximate building depth. See discussion below under “Earthquake Engineering.”***
12. *Provide a bibliography of published information referenced, including maps and best available science materials. **A bibliography or reference section is provided at the end of the text of this report.***
  - a. *For sites with mitigation, also provide the following information identified in 13 through 17 below. (Information in this section is to be provided only if there are critical areas within or in the vicinity of the site that will be impacted by the proposed project.)*
13. *A summary description of reasonable efforts made to apply mitigation sequencing pursuant to RZC 21.64.010.L, Mitigation Standards, Criteria and Plan Requirements, to avoid, minimize and mitigate impacts to critical areas. **The site is in the seismically active Puget Sound region. Ground shaking from potential earthquakes in the region is typically addressed by following procedures in the International Building Code (IBC). Site response parameters are derived from these procedures and used in structural design of the building. We have characterized the soil profile for this site as Site Class D. Surface fault rupture is unlikely to occur because of the distance to known active faults and the substantial thickness of glacial and post glacial sediments beneath the site. Slope failure due to seismic events are unlikely due to the level topography of the site. Our liquefaction analyses indicate that liquefaction induced settlements within the building area will be isolated and minor, estimated to be less than ½ to 1 inch. Therefore, we conclude that no specific mitigation measures for liquefaction need to be included in the building design. See further discussion below under “Earthquake Engineering.”***
14. *Plans for adequate mitigation, as needed, to offset an impact, including but not limited to:*
  - a. *The impacts to on-site and affected off-site critical areas; and*
  - b. *The impacts of any proposed alteration of a critical area or buffer on the development proposal, other properties, and the environment. **No specific mitigating measures for liquefaction-induced settlement are needed, based on our analyses. Ground shaking impacts will be***



**addressed by applying the 2015 IBC parameters provided in the “Earthquake Engineering” section below.**

15. A listing of applicable performance standards and a summary of how each applicable performance standard was addressed. (See RZC 21.64.010.M, Performance Standards for Mitigation Planning.). **N/A.**
16. A discussion of ongoing management practices that will protect the critical area after the project site has been developed, including proposed monitoring and maintenance programs. **N/A.**
17. Additional information may be required. The Technical Committee may require additional information to be included in the critical areas report when deemed necessary to the review of the proposed activity.

## **5.2. Geologically Hazardous Areas Reporting Requirements (Appendix 1.E)**

The following Geologically Hazardous Areas Reporting Requirements from Appendix 1.E are in addition to the General Information listed in Appendix 1.A above.

*A geologically hazardous areas report shall be prepared by a geotechnical engineer or geologist, licensed in the State of Washington, with experience analyzing geologic, hydrologic, and groundwater flow systems; or by a geologist who earns his or her livelihood from the field of geology and/or geotechnical analysis, with experience analyzing geologic, hydrologic, and groundwater flow systems, who has experience preparing reports for the relevant type of hazard.*

1. A geologically hazardous areas report must be submitted to the City. The purpose of this report is to evaluate the actual presence of geologic conditions giving rise to geologic hazards; determine the appropriate class of hazard, according to the classification of potential hazards contained in these regulations; evaluate the safety and appropriateness of proposed activities; and recommend appropriate construction practices, monitoring programs and other mitigation measures required to ensure achievement of the purpose and intent of these regulations. The information required by this report should be coordinated with the study and reporting requirements for any other critical areas located on the site. **The site is within a mapped Seismic Hazard Area but not within or near mapped Landslide or Erosion Hazard Areas. As described previously and below in the “Earthquake Engineering” section, ground shaking parameters will be applied in seismic design of the building, and liquefaction induced settlements are expected to be small.**
2. The approach of the City of Redmond critical areas regulations is to require a level of study and analysis commensurate with potential risks associated with geologic hazards on particular sites and for particular proposals. Depending on the particular geologic hazard, geologic, hydrologic and/or topographic studies may be required. As a minimum, all applicants shall review the history of the site and conduct a surface reconnaissance. **As part of our evaluation, we reviewed available geologic maps, geologic hazard maps, boring logs and property history. We have also completed multiple visits to the site.**
3. Geologically Hazardous Area Report. The geologically hazardous area report shall include the following information:
  - a. Geologically Hazardous Areas Map. Geologic hazards shall be located on a site map with an engineering scale of one inch equals 20 feet. The map must show the surveyed locations of all geologic hazards and their required buffers/setbacks. In addition, the map must show topography



at two-foot intervals. **Figure 2 includes the above information. (The full size (22 inches by 34 inch) PDF version of Figure 2 is at a scale of 1 inch equals 20 feet.) The entire site is within a mapped Seismic Hazard Area.**

- b. A written geologically hazardous area report which includes the following information:
- i. A written geologic hazards characterization. This characterization shall describe specific descriptions of geologic hazards present on-site, including topography; a characterization of soils, geology, and drainage; a characterization of groundwater conditions, including the presence of any public or private wells within one quarter mile of the site; and groundwater elevation, gradient and direction data, including depth and duration of seasonally high water table if any proposed grading borings pilings or excavation work may extend to groundwater depth; identification of any areas that have previously been disturbed or degraded by human activity or natural processes; and a site history.
  - ii. A written analysis of proposed clearing, grading and construction activities, including construction scheduling; potential direct and indirect, on-site and off-site impacts from development, including dewatering activities. The analysis shall include identification of proposed mitigation measures, including any special construction techniques, monitoring or inspection program, erosion or sedimentation programs (during and after construction), and surface water management and protection controls. **A characterization of the site is provided above in "Site Description." A summary of public or private wells within one quarter mile of the site is being provided in our separate CARA report. Analysis and recommendations pertaining to clearing, grading and construction activities are being provided in our separate geotechnical report.**
- c. Critical Landslide Hazard Areas (Steep Slopes). In addition to the geologically hazardous area report required above, the following tasks and information are required for critical landslide hazard areas. **N/A, as the site has level topography and is not within or near a mapped Landslide Hazard Area.**
- i. Review site history and available information.
  - ii. Conduct a surface reconnaissance of the site and adjacent areas.
  - iii. Conduct subsurface exploration suitable to site and proposal to assess geohydrologic conditions.
  - iv. Conduct detailed slope stability analysis.
  - v. Recommend detailed surface water management controls during construction and operation.
  - vi. Establish recommendations for site monitoring and inspection during construction.
  - vii. Recommend minimum steep slope buffer distance(s). In no case, shall the setback be less than that required by RZC 21.64.060.B, Landslide Hazard Area Buffers.
- d. Critical Erosion Hazard Areas. In addition to the geologically hazardous area report required above, the following tasks and information are required for critical erosion hazard areas: **N/A, as the site has level topography and is not within or near a mapped Erosion Hazard Area.**
- i. Review site history and available information.
  - ii. Conduct a surface reconnaissance of the site and adjacent areas.

- iii. *Identify surface water management, erosion and sediment controls appropriate to the site and proposal.*
- e. *Seismic Hazard Areas. In addition to the geologically hazardous area report required above, the following tasks and information are required for seismic hazard areas:*
  - i. *For one- and two-story single family structures, conduct an evaluation of site response and liquefaction potential based on the performance of similar structures under similar foundation conditions. **N/A.***
  - ii. *For all other proposals, conduct an evaluation of site response and liquefaction potential, including sufficient subsurface explorations to provide a site coefficient (S) for use in the static lateral force procedure described in the International Building Code. **See the following report section, which is also included in our separate geotechnical report.***

### 5.3. Earthquake Engineering

#### 5.3.1. 2015 IBC Seismic Design Information

We recommend the use of the following 2015 IBC parameters for short period spectral response acceleration ( $S_s$ ), 1-second period spectral response acceleration ( $S_1$ ) and seismic coefficients ( $F_A$  and  $F_v$ ) for the project site.

2015 IBC Parameter	Recommended Value
Soil Profile Type	D
Short Period Spectral Response Acceleration, $S_s$ (percent g)	125.5
1-Second Period Spectral Response Acceleration, $S_1$ (percent g)	48.1
Seismic Coefficient, $F_A$	1.0
Seismic Coefficient, $F_v$	1.52

#### 5.3.2. Seismic Hazards

As mentioned above, the site is within a mapped Seismic Hazard area. Potential seismic hazards from earthquakes include ground shaking, surface fault rupture, liquefaction, lateral spreading and landslides. We evaluated the likelihood of each of these hazards at the site, except for landslides, which are very unlikely to occur due to the gentle topography. Ground shaking is addressed through use of the IBC parameters provided above.

Based on our knowledge of regional geology in the vicinity of the site, distance to known active faults, and the substantial thickness of glacial and postglacial sediments beneath the site, we conclude the potential for surface fault rupture is remote.

Liquefaction is a condition where soils experience a rapid loss of internal strength resulting from strong ground shaking. Ground settlement, lateral spreading and sand boils may result from soil liquefaction. Structures supported on large zones of liquefied soils could undergo potentially damaging settlements or lateral movement. Conditions favorable for liquefaction include loose to medium dense sand with a low percentage of silt, and which are below the ground water table.

Based on the previous explorations and our liquefaction analyses, we conclude liquefaction induced settlements at the site will be isolated and minor, estimated to be less than about ½ to 1 inch.

Some lateral spreading may occur immediately adjacent to the Sammamish River banks during a large earthquake. We do not anticipate the lateral spreading would extend to the project site because of the low potential for liquefaction at the site; therefore, the risk of lateral spreading at the site is low.

## **6.0 LIMITATIONS**

We have prepared this report for use by G.W. Williams Co., Cleverly Development Consulting, and their authorized agents in the permitting and design phase of The Osprey residential development to be located at 7440 159<sup>th</sup> Place NE in Redmond, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix B, Report Limitations and Guidelines for Use, for additional information pertaining to use of this report.

## **7.0 REFERENCES**

Associated Earth Sciences, Inc., 2014. Subsurface Exploration, Liquefaction Hazard Assessment, and Geotechnical Engineering Report, Queen City Auto, 7494 and 7500 159<sup>th</sup> Place NE, Redmond, Washington.

Associated Earth Sciences, Inc., 2015. Hydrogeologic and Infiltration Assessment Report, The Carter, Redmond, Washington.

City of Redmond. 2018. Application Requirements for PREP – Land Use Entitlement.

City of Redmond, Redmond Municipal Code. Sections 21.64 – 21.72.

GeoEngineers, Inc. 1988. Report of Geotechnical Engineering Services, Leary Way Improvements, Project No. 87-ST-74, Redmond, Washington, for City of Redmond.

GeoEngineers, Inc., 2019a, Hydrogeologic Services, Critical Aquifer Recharge Area Report, The Osprey, Proposed Residential Development, King County Tax Parcel 9270700080, 7440 159<sup>th</sup> Place NE, Redmond, Washington.

GeoEngineers, Inc., 2019b, Geotechnical Engineering Services, Design Phase, Proposed Residential Development, King County Tax Parcel 9270700080, 7440 159<sup>th</sup> Place NE, Redmond, Washington.

G-Logics, Inc. 2018. Phase II Environmental Site Assessment, Evans Auto Center, 7440 159<sup>th</sup> Place NE, Redmond, WA 98052.

International Code Council, International Building Code, 2015

Minard, J.P. 1983. United States Geological Survey, Geologic Map of the Kirkland Quadrangle, Washington, Miscellaneous Field Studies Map MF-1543.

PanGeo, Inc. 2018. Geotechnical Feasibility Study, Evans Auto Center: 7440 159<sup>th</sup> Place Northeast, Redmond, Washington.

U.S. Geological Survey – National Seismic Hazard Mapping Project Software, Earthquake Ground Motion Parameters, Version 5.1.0, 2008 data, 2019.







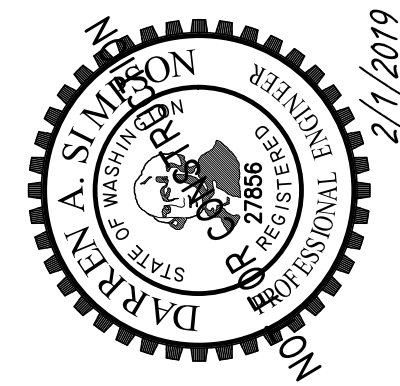






This approval is for the design concept only. These plans appear to be in conformance with the City Of Redmond design standards for construction. This approval shall not be construed as authorizing construction not in accordance with applicable City standards. The City reserves the right to require revisions to the approved plans to assure conformance with City of Redmond design standards for construction at any time that it is discovered that the proposed construction does not otherwise meet the applicable construction standards. The owner is required to provide designs and plans in accordance with applicable City standards and assures that construction is accomplished in accordance with those standards. The owner and/or design engineer and/or developer may be required to make necessary approved field revisions to correct any errors or omissions found on the approved plan.

C-1

 $1'' = 20''$ The logo for DCI Engineers is located in the bottom right corner. It features the letters "DCI" in a large, bold, sans-serif font. To the right of "DCI", the word "ENGINEERS" is written in a smaller, all-caps, sans-serif font. Below "ENGINEERS", the company's address is listed: "818 STEWART STREET • SUITE 1000", "SEATTLE, WASHINGTON 98101". Further down, the contact information is provided: "PHONE: (206) 332-1900 • FAX: (206) 332-1600" and "WEBSITE: [www.dci-engineers.com](http://www.dci-engineers.com)". At the very bottom, the company's specialization is noted: "CIVIL / STRUCTURAL AND TRAFFIC ENGINEERING".



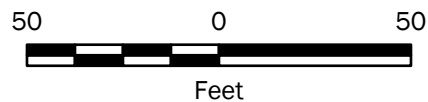
P:\23\23699001\GIS\23699001\_Project\23699001\_Project.aprx/23699001\_T0200\_F04\_SeismicHazards Date Exported: 04/08/19 by glomhmer



### Legend

 Site Boundary

 Seismic Hazard Area



### Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Seismic Hazard data from City of Redmond WA, Aerial from ESRI

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

### Seismic Hazard Areas

Proposed Residential Development  
Redmond, Washington



Figure 4



## **APPENDIX A**

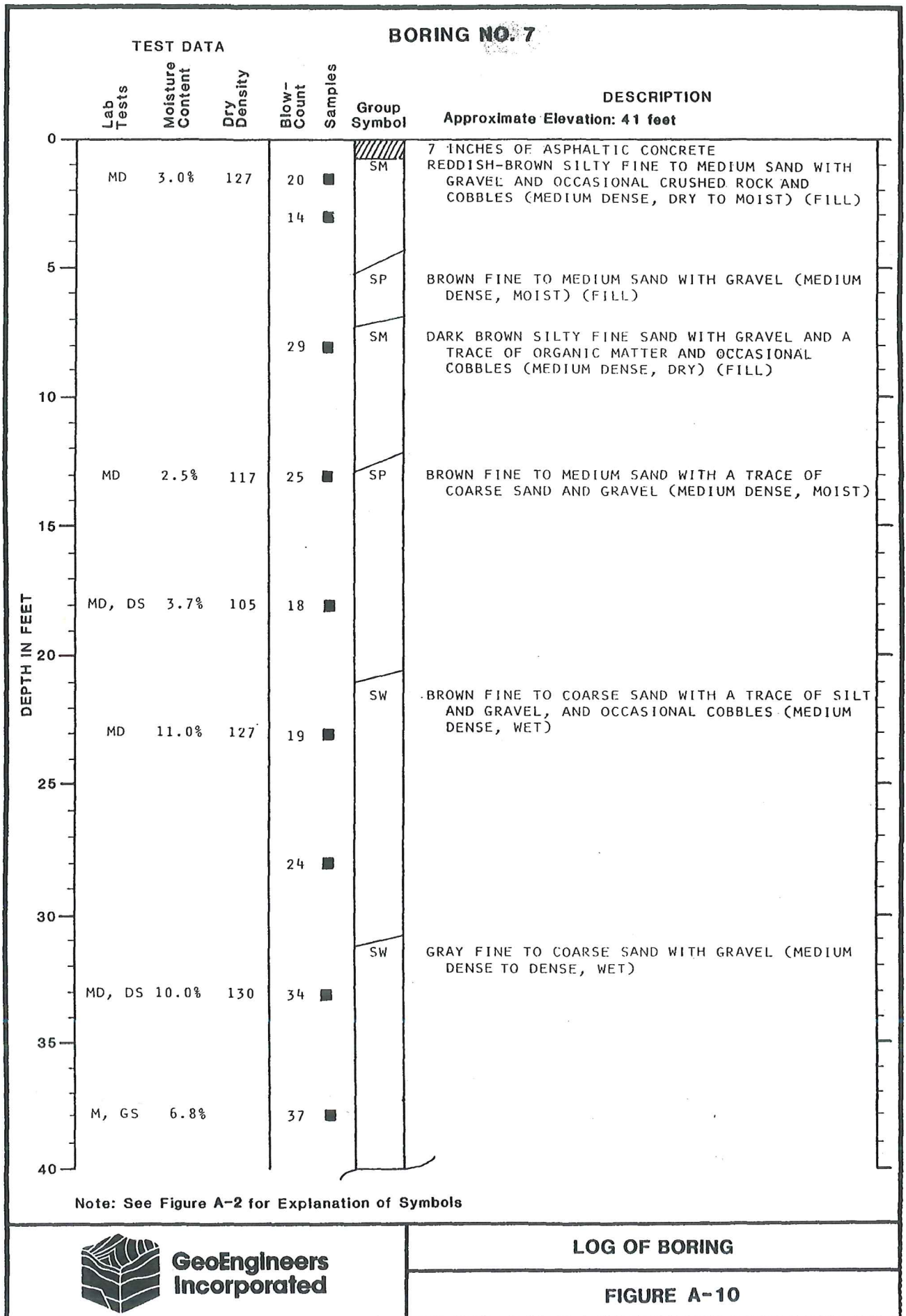
### **Previous Explorations**

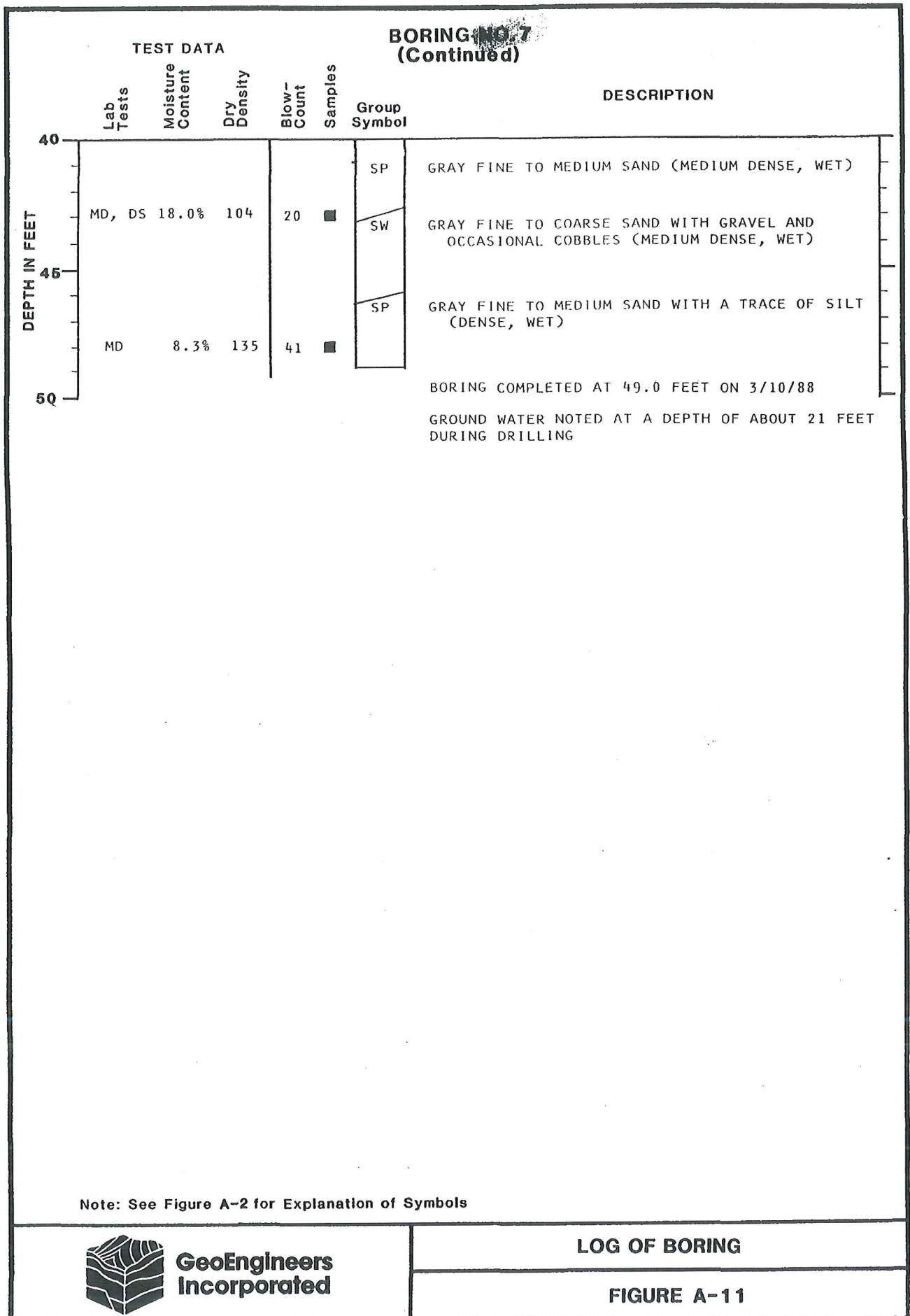
## **APPENDIX A**

### **PREVIOUS EXPLORATIONS**

This appendix presents logs of selected borings completed by GeoEngineers in 1988 and by others in 2014 and 2018 within and near the project site.

The approximate locations of the previous borings are shown on the Site Plan, Figure 2.







Associated Earth Sciences, Inc.

## Exploration Log

Project Number  
KE140132AExploration Number  
EB-4Sheet  
1 of 1Project Name  
Queen City AutoLocation  
Redmond, WADriller/Equipment  
Geologic Drill / XL RigHammer Weight/Drop  
140# / 30"

Ground Surface Elevation (ft)

Datum  
N/ADate Start/Finish  
3/31/14, 3/31/14Hole Diameter (in)  
8 inches

Depth (ft)	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot				Other Tests
								10	20	30	40	
				Asphalt - 2 inches Quaternary Younger Alluvium								
5		S-1		Medium dense, moist, brown, medium sandy fractured GRAVEL, few fine sand, few silt; stratified (~3 inches thick) (GP-GM).		11 12 13			▲25			
		S-2		Medium dense, moist to very moist, brown, fine to medium SAND, little fractured gravel, trace coarse sand, few silt; stratified to thinly stratified (SM-SP).		9 11 13			▲24			
10		S-3		Very dense, slightly moist, brown to dark brown, fine to medium SAND, with gravel, trace coarse sand, few to little silt; faintly stratified (SM-SP).		15 18 32						▲50
		S-4		Very dense, slightly moist to moist, brown, fine to medium SAND, little gravel, trace coarse sand, few to little silt; faintly stratified (SM-SP).		21 44 25						▲69
15		S-5		Medium dense, wet, brown, fine to medium SAND, with fine gravel, few coarse sand, few silt; faintly stratified (~4 inches thick) (SM-SP).		14 13 12			▲25			
20		S-6		6 inch sample; 7 inches heave. Very dense, wet, brown, gravelly fine to medium SAND, trace coarse sand, few silt; massive (SM-SP).		50/6"						▲50/6"
25		S-7		9 inch sample; 12 inches heave. Very dense, wet, grayish brown, GRAVEL, with medium to coarse sand, trace fine sand, trace silt; massive (GP).		24 34 33						▲67
30				Bottom of exploration boring at 26.5 feet Blow counts are likely overstated due to high gravel content of soils. Soil densities likely range from loose to medium dense.								
35												

Sampler Type (ST):



2" OD Split Spoon Sampler (SPT)



No Recovery

M - Moisture



3" OD Split Spoon Sampler (D &amp; M)



Ring Sample

▽ Water Level ( )



Grab Sample



Shelby Tube Sample



Water Level at time of drilling (ATD)

Logged by: DMG

Approved by:

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0							8" Boring
16			No Recovery at 2.5'				Well Box
21							Well Cap
25							Concrete Seal
							Bentonite Seal
5	10-14	GLMW-1-5	5-6.5': SAND, medium to coarse grained with fine to coarse gravel, brown, dry, no odor.	5	SW	0.0	2" PVC Blank
10	18-24	GLMW-1-10	10-11.5': SAND, medium to coarse grained with fine to coarse gravel, brown, dry, no odor.	30	SW	0.0	
15	18-29	GLMW-1-15	15-16.5': SAND, medium to coarse grained with fine to coarse gravel, brown, dry, no odor.	20	SW	0.1	
20	50/3	GLMW-1-20	20-21.5': SAND, coarse grained with fine to coarse gravel, brown, wet, no odor.	60	SW	0.1	Sand
25	8-40	GLMW-1-25	25-25.75': SAND, coarse grained with fine to coarse gravel, brown, wet, no odor.	100	SW	0.1	
	50/3		25.75-26.5': SAND, fine grained with trace silt, brown, moist to wet, no odor.		SP		2" PVC Screen
30							

Drilling Method: Hollow-stem auger

Date: 6/19/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Well Tag BKZ-663

Boring Diameter: 8"

Page 1 of 2

Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLMW-1



BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
							8" Boring
30	8 14 50/6	GLMW-1-30	30-30.75': GRAVEL with trace medium grained sand, brown, moist to wet, no odor. 30.75-31.5': SAND, fine grained with trace silt, brown, moist to wet, no odor.	100	GW  SP	0.0	Bentonite Backfill
35	8 32 50/4	GLMW-1-35	35-36.5': SAND, medium to coarse grained with fine to coarse gravel, brown, moist to wet, no odor.	100	SW	0.1	
40	7 21 28	GLMW-1-40	40-41.5': SAND, medium to coarse grained with fine to coarse gravel, brown, moist to wet, no odor.	100	SW ▽	0.1	
45							
50							
55							
60							

Depth in feet

Drilling Method: Hollow-stem auger

Date: 6/19/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Well Tag BKZ-664

Boring Diameter: 8"

Page 2 of 2

Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLMW-1

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0							8" Boring Well Box Well Cap Concrete Seal Bentonite Seal
5	5 14 13	GLMW-2-5	5-6.5': SAND, medium to coarse grained with fine to coarse gravel, brown, moist, no odor.	40	SW	0.0	2" PVC Blank
10	6 11 11	GLMW-2-10	10-11.5': SAND, medium to coarse grained with fine to coarse gravel, brown, moist, no odor.	30	SW	0.1	
15	15 28 30	GLMW-2-15	15-16.5': SAND, medium to coarse grained with fine to coarse gravel, brown, dry, no odor.	40	SW	0.0	
20	24 50/4	GLMW-2-20	20-21.5': SAND, coarse grained with fine to coarse gravel, brown, wet, no odor. Very thin layer of silty sand at 21.5'.	20	SW	0.1	Sand
25	20 50/3	GLMW-2-25	25-26.5': SAND, fine to medium grained with trace gravel, brown, wet, no odor.	70	SP	0.0	2" PVC Screen
30							

Depth in feet

Drilling Method: Hollow-stem auger

Date: 6/19/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Well Tag BKZ-664

Boring Diameter: 8"

Page 1 of 2

Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLMW-2



BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
							8" Boring
30	3 15 27	GLMW-2-30	30-31.5': SAND, fine to medium grained with trace gravel, brown, moist to wet, no odor.	100	SP	0.0	Bentonite Backfill
35	11 14 18	GLMW-2-35	35-36.5': SAND, medium grained with trace gravel, brown, moist to wet, no odor.	90	SP	0.1	
40	3 9 13	GLMW-2-40	40-41.5': SAND, medium grained with trace gravel, brown, wet, no odor.	30	SP ▽	0.1	
45							
50							
55							
60							

Depth in feet

Drilling Method: Hollow-stem auger

Date: 6/19/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Well Tag BKZ-664

Boring Diameter: 8"

Page 2 of 2

Logged By: H. Carter



**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLMW-2

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0							8" Boring
2	2-4	GLMW-3-2.5	2.5-4': SAND, fine grained with fine gravel, brown, dry, slight petroleum odor, woodchips at 4'.	10	SW	6.1	Well Box Well Cap Concrete Seal
4							Bentonite Seal
5	12-18	GLMW-3-5	5-6.5': SAND, fine grained with fine to coarse gravel, brown, dry, no odor.	15	SW	2.8	2" PVC Blank
10	10-37	GLMW-3-10	10-11.5': SAND, medium grained with fine to coarse gravel, brown, moist to dry, no odor.	50	SW	0.3	
15	20-40	GLMW-3-15	15-16.5': SAND, medium grained with fine to coarse gravel, brown, moist to dry, no odor.	60	SW	0.1	
20	34-17	GLMW-3-20	20-21.5': SAND, medium grained with fine to coarse gravel, brown, wet, no odor.	10	SW	0.0	Sand
25	8-32	GLMW-3-25	25-26.5': SAND, fine to medium grained with trace gravel, gray brown, moist, no odor.	100	SP	0.1	2" PVC Screen
30							

Drilling Method: Hollow-stem auger

Date: 6/20/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Well Tag BKZ-665

Boring Diameter: 8"

Page 1 of 2





Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLMW-3



BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
							8" Boring
30 14 50/6		GLMW-3-30	30-31.5': SAND, fine to medium grained with trace gravel, brown, moist to wet, no odor.	100	SP	0.0	 Bentonite Backfill
35 6 17 47		GLMW-3-35	35-36.5': SAND, medium grained with trace gravel, brown, moist to wet, no odor.	100	SP	0.0	
40 6 17 32		GLMW-3-40	40-41.5': SAND, fine to medium grained with trace gravel, brown, wet, no odor.	90	SP	0.0	
45							
50							
55							
60							

Depth in feet

Drilling Method: Hollow-stem auger

Date: 6/20/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Well Tag BKZ-665

Boring Diameter: 8"

Page 2 of 2

Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLMW-3

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0							Temporary Boring, Backfilled with Bentonite
5	5-11	GLB-1-2.5	2.5-4': SAND, medium to coarse grained with fine to coarse gravel, brown, moist, no odor.	5	SW	0.3	
10	14-20	GLB-1-5	5-6.5': SAND, fine grained with fine to coarse gravel, gray brown, dry, no odor.	<5		0.0	
15	16-50/5	GLB-1-7.5	7.5-9': SAND, medium to coarse grained with fine to coarse gravel, brown, moist to dry, no odor.	15	SW		
20	8-11	GLB-1-10	10-11.5': SAND, medium to coarse grained with fine to coarse gravel, brown, moist to dry, no odor.	30	SW	0.0	
25			No Recovery				
30	50/5	GLB-1-20	20-21.5': SAND, coarse grained with fine to coarse gravel, gray brown, wet, no odor.	15	SW	0.1	

Drilling Method: Hollow-stem auger

Date: 6/20/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Boring Diameter: 8"

Page 1 of 1

Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLB-1

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0							Temporary Boring, Backfilled with Bentonite
7 11 6	GLB-2-2.5	2.5-4': SAND, medium grained with fine to coarse gravel, brown, dry, no odor.	10	SW	0.2		
5 7 11 18	GLB-2-5	5-6.5': SAND, medium grained with fine to coarse gravel, brown, dry, no odor.  No Recovery	5	SW	0.3		
10 13 17 12	GLB-2-10	10-11.5': SAND, fine to medium grained with fine to coarse gravel, brown, dry, no odor.	5	SW	0.3		
15 10 19 19	GLB-2-15	10-11.5': SAND, fine to medium grained with fine to coarse gravel, brown, dry, no odor.	40	SW	0.4		
20 10 7 4	GLB-2-20	20-21.5': SAND, fine to medium grained with fine to coarse gravel, brown, wet, no odor.	10	SW	0.3		
25							
30							

Depth in feet

Drilling Method: Hollow-stem auger

Date: 6/20/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Boring Diameter: 8"

Page 1 of 1

Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLB-2



BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0			0-4': SAND, very fine to fine grained with fine to coarse gravel and silt, brown, moist, no odor.				Temporary Boring, Backfilled with Bentonite
		GLB-3-4		20	SW	0.0	
5			4-19': SAND, medium grained with fine to coarse gravel, brown, dry, no odor.				
		GLB-3-8		15	SW	0.0	
10							
		GLB-3-12		15	SW	0.0	
15							
		GLB-3-16		20	SW	0.0	
20				60		0.0	
		GLB-3-20	19-24': SAND, medium to coarse grained with fine to coarse gravel and trace silt, brown, wet, no odor.				
		GLB-3-24		70	SW	0.0	
25							
30							

Depth in feet

Drilling Method: Direct Push

Date: 6/19/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Boring Diameter: 2"

Page 1 of 1

Logged By: H. Carter



**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLB-3



BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0			0-9': SAND, very fine to fine grained with fine to coarse gravel and silt, light brown, dry, no odor.				Temporary Boring, Backfilled with Bentonite
		GLB-4-5		70	SW	0.0	
5							
		GLB-4-9	9-12': SAND, very fine to fine grained with fine to coarse gravel and silt, red, dry, slight petroleum odor.	60	SW	0.0	
10							
		GLB-4-12	12-16': SAND, very fine to fine grained with fine to coarse gravel and silt, light brown, dry, no odor.	30	SW	0.0	
15							
		GLB-4-16	16-19': SAND, fine grained with fine to coarse gravel and trace silt, red, dry, no odor.	30		0.2	
					SW		
		GLB-4-19		40	▽	0.6	
20							
25							
30							

Depth in feet

Drilling Method: Direct Push

Date: 6/19/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Drill tip stuck in ground at 10'. Had to move hole and re-drill.

Boring Diameter: 2"

Page 1 of 1

Logged By: H. Carter

*g-logics*

**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLB-4

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0							Temporary Boring, Backfilled with Bentonite
			No Recovery				
5	6 7 9	GLB-5-5	5-6.5': SAND, medium to coarse grained with fine to coarse gravel, brown, moist to dry, no odor.	10		0.0	
	11 50/6	GLB-5-7.5	7.5-9': SAND, medium to coarse grained with fine to coarse gravel, brown, moist to dry, no odor.	5	SW	0.0	
10	14 19 12	GLB-5-10	10-11.5': SAND, medium to coarse grained with fine to coarse gravel, brown, moist to dry, no odor.	5	SW	0.0	
15	4 12 19	GLB-5-15	10-11.5': SAND, fine to medium grained with trace silt, brown, moist to dry, no odor.	40	SP	0.0	
20	22 50/3	GLB-5-20	20-21.5': SAND, medium to coarse grained with fine to coarse gravel, brown, wet, no odor.	10	SW	0.0	
25							
30							

Depth in feet

Drilling Method: Hollow-stem auger

Date: 6/20/2018

Other Information:

Drilling Company: Holocene

Weather: Sunny

Boring Diameter: 8"

Page 1 of 1

Logged By: H. Carter




**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLB-5

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0			0-2.5': SAND, fine grained with silt and occasional gravel, brown, dry, no odor.				Temporary Boring, Backfilled with Bentonite
		GLB-6-2.5	2.5-13': SAND, medium to coarse grained with fine to coarse gravel and silt, brown, dry to moist, no odor.	30	SW	0.0	
5							
		GLB-6-7.5			SW	0.0	
		GLB-6-10		50		0.0	
10							
		GLB-6-13	13-15': SAND, coarse grained with silt and trace gravel, brown, slightly moist, no odor.	100	SP	0.0	
15							
		GLB-6-20	15-20': SAND, medium to coarse grained with fine to coarse gravel, brown, dry to wet (20'), no odor.	40	SW	0.0	
20							
25							
30							

Depth in feet

Drilling Method: Direct Push	Date: 6/26/2018	Other Information:
Drilling Company: Holocene	Weather: Cloudy	
Boring Diameter: 2"	Page 1 of 1	
Logged By: Z. Wall		

	<b>Boring/Well Log</b> <b>Evans Auto Center</b> <b>7440 159<sup>th</sup> Place NE</b> <b>Redmond, Washington</b>	GLB-6
---	---	-------



BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0			0-10': SAND, fine grained with silt and trace gravel, brown, dry, no odor.				Temporary Boring, Backfilled with Bentonite
		GLB-7-5		5	SW	0.0	
5					SW		
		GLB-7-10		5		0.8	
10			10-15': SAND, fine to coarse grained with fine to coarse gravel, brown, slightly moist, no odor.		SW		
		GLB-7-15		75		0.0	
15			15-23': SAND, medium to coarse grained with fine to coarse gravel and silt, brown, dry to slightly moist, no odor.		SW		
		GLB-7-20		100		0.0	
20							
		GLB-7-23	23-25': SAND, coarse grained with fine to coarse gravel, brown, wet, no odor.	100	SW	0.0	
25							
30							

Depth in feet

Drilling Method: Direct Push

Date: 6/26/2018

Other Information:

Drilling Company: Holocene

Weather: Cloudy

Boring Diameter: 2"

Page 1 of 1

Logged By: Z. Wall



**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLB-7

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0			0-5': SAND, fine to medium grained with silt, Gravel, and wood, brown, dry, no odor.		SW		Temporary Boring, Backfilled with Bentonite
5		GLB-8-5	5-8': GRAVEL, fine to coarse grained with sand and silt, light brown, dry, no odor.	5	GW	0.0	
10		GLB-8-10	8-10': SAND, fine to coarse grained with fine to coarse gravel, brown, dry, no odor.	5		0.0	
15			No Recovery	75	SW		
20		GLB-8-20	23-25': SAND, fine to medium grained with fine to coarse gravel, brown, dry, no odor.	100	SW	0.0	
25		GLB-8-25		100	▽	0.0	
30							

Depth in feet

Drilling Method: Direct Push

Date: 6/26/2018

Other Information:

Drilling Company: Holocene

Weather: Cloudy

Boring Diameter: 2"

Page 1 of 1

Logged By: Z. Wall



**Boring/Well Log**  
**Evans Auto Center**  
**7440 159<sup>th</sup> Place NE**  
**Redmond, Washington**

GLB-8

## **APPENDIX B**

### **Report Limitations and Guidelines for Use**

## **APPENDIX B**

### **REPORT LIMITATIONS AND GUIDELINES FOR USE<sup>1</sup>**

This appendix provides information to help you manage your risks with respect to the use of this report.

#### **Read These Provisions Closely**

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory “limitations” provisions in its reports. Please confer with GeoEngineers if you need to know more how these “Report Limitations and Guidelines for Use” apply to your project or site.

#### **Geotechnical Services are Performed for Specific Purposes, Persons and Projects**

This report has been prepared for G. W. Williams Co., Cleverly Development Consulting and members of the design team for the Project specifically identified in this report. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with our revised proposal dated May 20, 2019 and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

#### **A Geotechnical Engineering or Geologic Report is Based on A Unique Set of Project-Specific Factors**

This report has been prepared for the design and permitting phase for The Osprey residential development to be located at 7440 159<sup>th</sup> Place NE in Redmond, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or
- Completed before important project changes were made.

---

<sup>1</sup> Developed based on material provided by GBA, GeoProfessional Business Association; [www.geoprofessional.org](http://www.geoprofessional.org).

For example, changes that can affect the applicability of this report include those that affect:

- The function of the proposed structure(s);
- Elevation, configuration, location, orientation or weight of the proposed structure;
- Composition of the design team; or
- Project ownership.

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

### **Environmental Concerns Are Not Covered**

Unless environmental services were specifically included in our geotechnical scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks or regulated contaminants.

### **Subsurface Conditions Can Change**

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

### **Geotechnical and Geologic Findings Are Professional Opinions**

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this report. Our report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

### **Geotechnical Engineering Report Recommendations Are Not Final**

We have developed our preliminary recommendations based on data gathered from subsurface exploration(s). These explorations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers



cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

### **A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation**

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

### **Do Not Redraw the Exploration Logs**

Geotechnical engineers and geologists prepare final exploration logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

### **Give Contractors a Complete Report and Guidance**

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- Advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- Encourages contractors to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

### **Contractors Are Responsible for Site Safety on Their Own Construction Projects**

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

## **Biological Pollutants**

GeoEngineers' Scope of Services specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client who desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

## **Information on Water Levels in the Ground May Be Confusing**

The groundwater information in this report may appear confusing and could be misunderstood. We try to show the depth at which groundwater was encountered on all our boring logs, but in some soils, this can be very different from the true groundwater level. Monitoring wells installed in borings give the most reliable information, but this may apply only to the soil layer(s) in which the well is screened. If the top of the well screen or sand/gravel pack is more than a few feet below the groundwater level, then that groundwater level may not correspond to the true groundwater elevation. Soils that are described on our logs as "wet" are usually below the groundwater level, but perched groundwater can also make the interpretation of groundwater conditions difficult.

Groundwater levels typically vary seasonally by a few feet to as much as 100 feet or more depending on location, site conditions, recharge, and many other factors. If in any doubt, you should have a hydrogeologist from GeoEngineers confer with appropriate members of the design team to help them interpret groundwater level information and apply it to the project. The consequences of misunderstanding groundwater levels can be serious, which impacts can range from drainage problems and inadequate provision for construction dewatering, to water intrusion, hydrostatic instability of the subgrade and uplift of completed structures.

